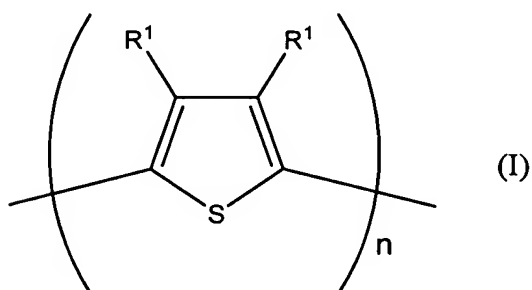


CLAIMS

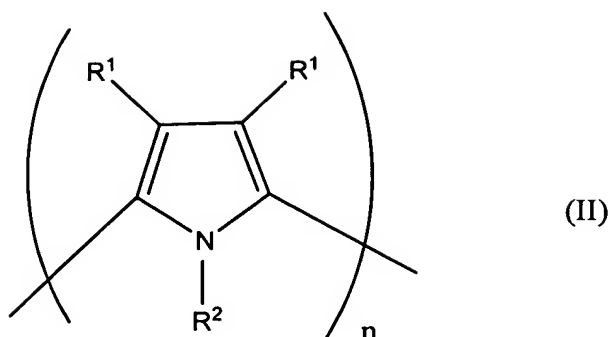
What is claimed is:

1. A composition comprising an aqueous dispersion of at least one conductive polymer and at least one colloid-forming polymeric acid, wherein the electrically conducting polymer is doped with at least one non-polymeric organic acid anion, and wherein the conductive polymer is selected from a polythiophene, a polypyrrole, a polyaniline, and combinations thereof.
2. A composition according to claim 1, wherein pH of the dispersion is between 1 and 8.
3. A composition according to Claim 1, wherein the polythiophene comprises Formula I:



wherein:

- $R^1$  is independently selected so as to be the same or different at each occurrence and is selected from hydrogen, alkyl, alkenyl, alkoxy, alkanoyl, alkythio, aryloxy, alkylthioalkyl, alkylaryl, arylalkyl, amino, alkylamino, dialkylamino, aryl, alkylsulfinyl, alkoxyalkyl, alkylsulfonyl, arylthio, arylsulfinyl, alkoxycarbonyl, arylsulfonyl, acrylic acid, phosphoric acid, phosphonic acid, halogen, nitro, cyano, hydroxyl, epoxy, silane, siloxane, alcohol, benzyl, carboxylate, ether, ether carboxylate, amidosulfonate, ether sulfonate, and urethane; or both  $R^1$  groups together may form an alkylene or alkenylene chain completing a 3, 4, 5, 6, or 7-membered aromatic or alicyclic ring, which ring may optionally include one or more divalent nitrogen, sulfur or oxygen atoms, and  $n$  is at least about 4.
4. A composition according to Claim 1, wherein the polypyrrole comprises Formula II:



wherein:

n is at least about 4;

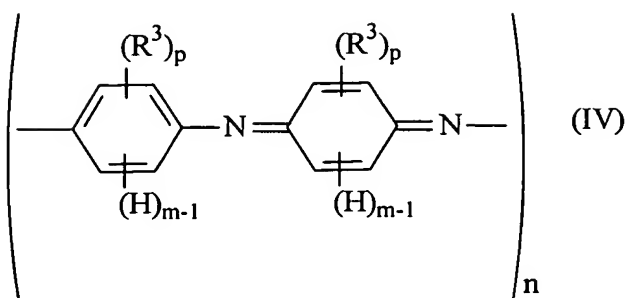
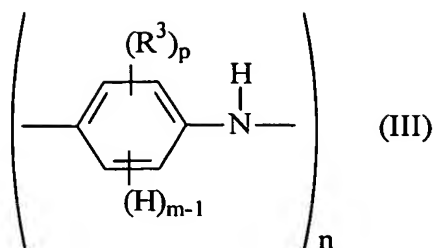
5        R¹ is independently selected so as to be the same or different at each occurrence and is selected from hydrogen, alkyl, alkenyl, alkoxy, alkanoyl, alkylthio, aryloxy, alkylthioalkyl, alkylaryl, arylalkyl, amino, alkylamino, dialkylamino, aryl, alkylsulfinyl, alkoxyalkyl, alkylsulfonyl, arylthio, arylsulfinyl, alkoxycarbonyl, arylsulfonyl, acrylic acid, phosphoric acid, phosphonic acid, 10        halogen, nitro, cyano, hydroxyl, epoxy, silane, siloxane, alcohol, benzyl, carboxylate, ether, ether carboxylate, amidosulfonate, ether sulfonate, and urethane; or both R¹ groups together may form an alkylene or alkenylene chain completing a 3, 4, 5, 6, or 7-membered aromatic or alicyclic ring, which ring may optionally 15        include one or more divalent nitrogen, sulfur or oxygen atoms; and

20        R² is independently selected so as to be the same or different at each occurrence and is selected from hydrogen, alkyl, alkenyl, aryl, alkanoyl, alkylthioalkyl, alkylaryl, arylalkyl, amino, epoxy, silane, siloxane, alcohol, benzyl, carboxylate, ether, ether carboxylate, amidosulfonate, ether sulfonate, and urethane.

5.        A composition according to Claim 1, wherein the polyaniline comprises Formula III or Formula IV:

25

30



5

wherein:

n is at least about 4;

10 p is an integer from 0 to 4;

m is an integer from 1 to 5, with the proviso that  $p + m = 5$ ; and

$\text{R}^3$  is independently selected so as to be the same or different at

each occurrence and is selected from alkyl, alkenyl, alkoxy,

cycloalkyl, cycloalkenyl, alkanoyl, alkythio, aryloxy,

15 alkylthioalkyl, alkylaryl, arylalkyl, amino, alkylamino,

dialkylamino, aryl, alkylsulfinyl, alkoxyalkyl, alkylsulfonyl,

arylthio, arylsulfinyl, alkoxycarbonyl, arylsulfonyl, carboxylic

acid, halogen, cyano, or alkyl substituted with one or more of

sulfonic acid, carboxylic acid, halo, nitro, cyano or epoxy

20 moieties; or any two  $\text{R}^3$  groups together may form an alkylene

or alkenylene chain completing a 3, 4, 5, 6, or 7-membered

aromatic or alicyclic ring, which ring may optionally include one

or more divalent nitrogen, sulfur or oxygen atoms.

25 6. A composition according to Claim 1, wherein the non-polymeric organic acid anion is selected from acetate, p-toluenesulfonate, camphorsulfonate, p-dodecylbenzenesulfonate, methanesulfonate, trifluoromethanesulfonate, and mixtures thereof.

7. A composition according to Claim 1, wherein said colloid-forming polymeric acid is selected from polymeric sulfonic acids, polymeric phosphoric acids, polymeric phosphonic acids, polymeric carboxylic acids, polymeric acrylic acids, and mixtures thereof.

5        8. A composition according to Claim 7, wherein said colloid-forming polymeric acid comprises a fluorinated polymeric sulfonic acid.

9. A composition according to Claim 8, wherein said polymeric sulfonic acid is perfluorinated.

10       10. A composition according to Claim 1, further comprising an additional material selected from polymers, dyes, carbon nanotubes, metal nanowires, metal nanoparticles, carbon nanoparticles, carbon fibers, carbon particles, graphite fibers, graphite particles, coating aids, organic and inorganic conductive inks and pastes, charge transport materials, semiconductive or insulating inorganic oxide nano-particles, piezoelectric, pyroelectric, or ferroelectric oxide nano-particles or polymers, photoconductive oxide nanoparticles or polymers, dispersing agents, crosslinking agents, and combinations thereof.

11. A composition according to Claim 1, further comprising at least one co-dispersing liquid.

20       12. A composition according to Claim 11, wherein the co-dispersing liquid is selected from ethers, cyclic ethers, alcohols, alcohol ethers, ketones, nitriles, sulfides, sulfoxides, amides, amines, carboxylic acids, and combinations thereof.

25       13. An electrically conductive or semiconductive layer deposited from a composition according to Claim 1.

14. A buffer layer deposited from a composition according to Claim 1.

15. A buffer layer according to claim 14 wherein said colloid-forming polymeric acid is perfluoroethylenesulfonic acid.

30       16. A buffer layer made from an aqueous dispersion comprising electrically conductive polypyrrole/non-polymeric acid dopant and polymeric perfluoroethylenesulfonic acid, wherein the aqueous dispersion has a pH greater than 2 and a weight ratio of polymeric perfluoroethylenesulfonic acid to polypyrrole +non-polymeric acid anion greater than 1.

35       17. An electronic device or other applications comprising at least one layer comprising at least one composition of Claim 1.

18. A device according to Claim 17, wherein the device or application is selected from devices that convert electrical energy into radiation, devices that detect signals through electronics processes, that convert radiation into electrical energy, devices having at least one  
5 electronic component, memory storage devices, energy storage devices, antistatic films, biosensor devices, electrochromic devices, and electromagnetic shielding applications.

19. A method of making the composition of Claim 1, the method comprising one of the following:

- 10 (a) dispersing doped conductive polymer solids in an aqueous dispersion of colloid-forming polymeric acid;  
(b) dispersing colloid-forming polymeric acid solids in an aqueous dispersion of doped conductive polymer; and  
(c) combining the dispersion of doped conductive polymer with an  
15 aqueous dispersion of colloid-forming polymeric acid.